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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,998	03/12/2004	Jooyoung Yoon	04103-P0005A	6864
24126	7590	03/21/2006	EXAMINER	
ST. ONGE STEWARD JOHNSTON & REENS, LLC 986 BEDFORD STREET STAMFORD, CT 06905-5619			BEHSHAD, SHAHRAM	
			ART UNIT	PAPER NUMBER

1756

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/798,998

Applicant(s)

YOON ET AL.

Examiner

Shah Behshad

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2004.  
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-7 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 02182005.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 through 7 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Rau et. al. US 2004/0197676.

Rau et. al. disclose a process of forming an opening in a layer using two photoresist layers as recited in the claims of the current invention (see Figure 1-4). Paragraph 0025 teaches forming a base layer (referred to as a light absorbing layer) and two photoresist layers. Rau et. al. teaches an intermediate layer between the two photoresist layers which can be an anti-reflective layer (Paragraph 0031) as recited in claim 4. The second photoresist layer is exposed and developed (paragraphs 0028 and 0029). If an intermediate layer is present, it is removed to uncover the first photoresist layer (paragraph 0031). The second photoresist is then exposed to produce a pattern as depicted in figure 3 whereby the spacing of the first photoresist pattern is greater than the line width of the second photoresist pattern as recited in claim 1. It is then taught that an opening is etched into the base layer (P0036) followed by stripping any remaining photoresist (P0037).

Rau et. al. teaches the process as recited in claim 1-7 of the current application.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 through 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korean reference (KR0098994) in view of Fuller et. al. (US 2004/0197676).

In claim 1 of this invention, a four-layer system is disclosed; namely, a substrate, a lower photoresist layer, a blocking layer, and an upper photoresist layer. The inventors further claim that by using a novel process, a pattern could be formed in which the spacing between neighboring lines is reduced to be less than the resolution limit of the lithographic process.

In the patent disclosure KR0098994B, a photolithography process is disclosed whereby two layers of photoresist are formed on a polysilicon substrate. The first photoresist layer is then etched before the second layer is formed on top of the first layer. Then, the second layer is formed and etched using a mask. The polysilicon substrate is finally etched using the first and second layer as masks (see abstract). Figure 1c depicts the second photoresist pattern within the first photoresist pattern. KR0098994B does not teach an intermediate layer between the two photoresist layers. This is taught by Fuller et. al.

In their invention, Fuller et. al. claim a sequence of steps in a multi-layer resist process. Their invention claims that an anti-reflective layer is sandwiched between two photoresist layers that happen to be PMMA. This invention further claims that excellent line width control over steps is demonstrated. The process presented in their invention discloses the following steps: a first photo resist material is coated on a substrate and baked, an anti-reflective coating is then spin coated on top of the first layer, a third photoresist layer is finally coated on top of the anti-reflective layer. See column 3, lines 29 through 64 of their invention.

It would have been obvious to one of ordinary skill in the art to have used an anti-reflection layer as taught by Korean reference (KR 0098994) in the process of Fuller et. al. because Fuller teaches that excellent linewidth control steps is demonstrated. By using an anti-reflective layer, Fuller et. al. further claim that both the standing wave effect in top resist layer and the interface from the light scattered by the substrate topography are eliminated in this antireflective coating approach.

### ***Drawings***

Figure 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.


***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shah Behshad whose telephone number is (571) 272-8948. The examiner can normally be reached on 8:30 - 17:00, Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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KATHLEEN DUDA  
PRIMARY EXAMINER